The DEETER Group®

DeeterFlow
Automatic Liquid Dispenser

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1. Introduction

The DeeterFlow Automatic Liquid Dispenser incorporates a pump and a flow-meter to deliver a measured volume of liquid. Delivery can be initiated by the press of a button, by external input signal, or automatically by means of an internal timer. The timer can be selected to start dispensing at regular intervals or start dispensing at set times of the day, on a daily or weekly basis.

The volume is easy to select and is retained in non-volatile memory for repeat operation. Volumes between 0.20 litres and 100.00 litres can be selected in increments of 0.01 litres.

The dispenser includes a mesh filter at the inlet and an internal pump. The pump is self-priming and will maintain a constant flow-rate; typically around 3L/min for water (depending on external tubing, a clear filter, and the height the water is raised). **Note: some noise and vibration is generated by the pump when dispensing.**

A simple calibration method enables the dispenser to repeatedly deliver accurately measured volumes. When dispensing water, there are options to allow automatic adjustments for variations in temperature and drifts in flow-rate.

The dispenser can be connected to a PC for remote control and monitoring and an easy-to-use software programme can be downloaded from http://www.deeter.co.uk/downloads. An optional remote switch input is also provided for hands-free start/stop control.

Two additional external inputs and a transistor output are also provided, with their functions selectable by option menus. The inputs may be used to starts dispensing, stop dispensing, or to raise an alarm via the transistor output. The output can be linked to various dispenser functions and used to drive a relay or signal progress or alarms to other devices.

2. Installation

The dispenser has two John Guest Speedfit® push-fit connectors at the rear of the case for liquid in and out. The fittings take a tube outside diameter of 8mm and can be used with polyethylene, nylon, polyurethane, brass, copper, or mild steel tubing. (Tube inserts should be used for soft or thin-walled tubing).

Make sure the input and output tubes are pushed fully into the connectors before use. After initial resistance to insertion, the tube usually slips in by a few millimetres before hitting the stop position.

The 12VDC mains adapter supplied with the dispenser plugs into the socket labelled on the rear panel. Low voltage operation makes the dispenser safe to use in damp environments or where liquid can be spilt.

The dispenser is supplied with three circular connectors on the rear panel, whose uses are varied and optional:

> The 2-pin connector is for a remote switch, typically used with a foot-switch for hands-free control. See section 7 for a functional description.
>
> The 3-pin connector is for the transistor output. See section 8 for a description and connection details.
>
> The 6-pin connector is for two external inputs – see section 9.

A USB-B connector is provided on the front panel for automated control and monitoring by computer. A standard USB printer cable (not supplied) will link the dispenser to a PC. Installation and use of the PC software available for the dispenser is described in section 10.

3. Volume Accuracy

A calibration method allows fine adjustment of the delivered volume and can considerably reduce the size of any error. One or two dispenses into a measuring vessel (or weighed) should be performed to enable calculation of a percentage error. The result is then entered in the Calibration Menu (see section 6.8) with adjustments down to 0.1%.

Accuracy in percentage terms will be better for larger volumes than for smaller volumes. Repeated accuracy should be within ±1% of the target if the flow-rate and liquid temperature remain constant. Recalibration is recommended from time to time, particularly if flow-rate and temperature are changeable.

The flow-rate range is 0.5L/min to 5.0L/min. Outside this range accuracy will be poor and the display will indicate whenever these limits are exceeded and sound an optional warning. (The internal pump should not be capable of reaching the upper limit.)

The dispenser has options to compensate for varying flow-rate and temperature when used for dispensing water – see the *Compensation Menu* section (6.9). The adjustments are a 'best fit' for a typical dispenser and will not provide the accuracy that can be achieved at constant temperature and flow-rate, but will reduce the errors caused by these two variables.

4. Operator Controls

The front-panel display shows the selected volume and progress during dispensing. It also enables various option menus to be viewed and provides warning messages if error conditions are detected.

Normal operator controls consist of three push-button switches with the following symbols printed above them:

SYMBOL	∧	∨	↵
DESCRIPTION	UP	DOWN	ENTER

There is an optional external switch for remote start/stop control of the dispenser (see section 7), two optional inputs for automatic start and stop control (see section 9) and remote control is also possible via a PC (see section 10).

5. Operating States

5.1 Power-up

Power-up message

A	L	D		V	1	.	0	1							

The display shows the firmware version for 5 seconds at power-up, then progresses to the Ready state.

5.2 Ready State

There are four operating modes: Untimed, Interval timed, Daily timed and Weekly timed. The quiescent state when not dispensing or accessing the option menus is referred throughout as the 'Ready State' for all modes, although the word 'Ready' is only shown on the display in the untimed mode.

Changing the volume, using the top-up feature, and accessing Option menus are common to all four operating modes in their Ready state, using the front panel buttons as follows:

Press **UP** to increase the volume. Hold the button to rapidly increase the volume. The maximum setting is 100.00 litres.

Press **DOWN** to decrease the volume. Hold the button to rapidly decrease the volume. The minimum volume setting is 0.20 litres.

Hold the **UP** button and then **ENTER** to manually deliver a dose or a top-up at the end of a normal dispense (see *Top-up Dispensing).*

Hold the **ENTER** button for 3 seconds to access the Option Menus.

5.2.1 Ready State – Untimed

				R	E	A	D	Y						
	1	0	.	0	0			L	i	t	r	e	s	

In the Untimed mode, a single press of the **ENTER** button will start dispensing. The remote switch can also be used to start.

5.2.2 Ready State – Interval Timed

I	N	T	E	R	V	A	L		0	1	:	0	0
1	0	.	0	0	L				0	0	:	1	9

In Interval Timed mode, dispenses are started automatically at regular intervals. An interval of between 1 minute and 24 hours can be set, in one-minute divisions.

The top line of the display shows the interval setting in hours and minutes. The bottom line shows the volume and the countdown time. The colon of the countdown time blinks every second to indicate the passage of time. Seconds are not shown, so a displayed time of 00:00 for example, will indicate that there is less than one minute remaining.

5.2.3 Ready State – Daily Timed

		T	I	M	E	D			1	2	:	3	4
1	0	.	0	0	L				1	3	:	0	0

In Daily Timed mode, dispenses are started automatically at set times of the day. Up to eight start times can be set.

The top line shows the time-of-day with the colon blinking to indicate the passage of time. The bottom line indicates the next start time. If the start time is shown as **:**, no times have been set.

5.2.4 Ready State – Weekly Timed

W	E	D	N	E	S	D	A	Y		1	2	:	3	4
	1	0	.	0	0	L				1	3	:	0	0

In Weekly Timed mode, dispenses are started automatically at set times of the day on a 7-day basis. Up to eight start times per day can be set, including the option of having no times on some days.

The top line shows the weekday and time-of-day with the colon blinking to indicate the passage of time. The bottom line indicates the next start time. A start time shown as **:** indicates that no times have been set for the next 24 hours.

5.3 Dispensing

In all operating modes the display will show the flow rate, the delivered volume and the target volume when dispensing.

3	.	1	2		L	/	m	i	n		
4	.	5	6	/		1	0	.	0	0	

Pressing **ENTER** will stop delivery with 'PAUSED' shown on the display. Pressing **ENTER** again will resume delivery.

		P	A	U	S	E	D				
4	.	6	0	/		1	0	.	0	0	

Holding the **ENTER** button for 3 seconds will cancel delivery and return to Ready state.

Dispense accuracy will be compromised if the flow-rate exceeds the limits of 0.5L/min to 5.0L/min. Below 0.5 litres/minute, the word 'UNDER' will flash, alternating with the flow-rate, and a short beep will sound every 5 seconds if the Warning Beep option is enabled. At very low flow-rates the word 'UNDER' will remain constant, and if there is no detectable flow for 20 seconds, the dispenser will automatically go to the Paused state.

It should not be possible to exceed 5L/min with the pump provided. However, if this should happen, the word 'OVER' will flash, alternating with the flow rate.

When the target volume is reached, the dispenser will automatically return to Ready state. The buzzer will sound for 1.5 seconds (long beep) if the Finish Beep option is enabled.

The pump will automatically switch off in the Ready state during normal use. However, if air is allowed to enter the system and is trapped with the valve closed, the pump will remain on and the system will require priming. Starting a dispense will open the valve to allow priming (in timed modes this can be done using the top-up feature), but if there is no user intervention for 15 seconds the pump will switch off and the dispenser will enter Priming Mode – see the *Priming Mode* section for more details.

5.4 Top-Up Dispensing

Press and hold the **UP** button and then press **ENTER** to gain manual control of the dispense valve. This state may be used for adding a 'top-up' after normal dispensing, limited to a maximum of 10.00 litres.

(The press of the **UP** button will temporarily change the volume setting, but the previous setting will be restored immediately Top-Up Dispensing has started.)

Whenever **ENTER** is pressed the dispense valve will open. The flow rate will be shown on the top line of the display and the additional volume of liquid will be shown on the bottom line with a plus sign.

			3	.	1	2		L	/	m	i	n		
+	1	0	.	2	4		L	i	t	r	e	s		

When **ENTER** is released, the top line of the display shows the target volume while the bottom line continues to show the added volume.

		1	0	.	0	0		L	i	t	r	e	s	
+	1	0	.	2	4		L	i	t	r	e	s		

The dispenser will remain in Top-Up state while **UP** or **ENTER** are pressed and for 4 seconds after both buttons are released.

See also *Manual Mode*, accessed via the Option Menus

5.5 External Stops

The two optional external inputs can be selected to stop dispensing. These inputs can be used as emergency stops in case of an overflow level being reached or a leak being detected. They may also be used to deliver a volume determined by a float-switch rather than by the dispenser's volume setting.

				R	E	A	D	Y						
1	0	.	0	0	L		S	T	O	P		1		

If a stop input becomes active in any of the Ready states, the word 'Stop' appears on the bottom line followed by the identity number of the active input. In this state, dispensing cannot be started.

			S	T	O	P	P	E	D		2			
	4	.	5	6	/		1	0	.	0	0			

If a stop input becomes active when dispensing, the word 'Stopped' appears on the top line together with the identity number of the input. The bottom line continues to show delivered volume and target volume.

When a stop input changes to inactive, there are two actions the dispenser can perform: either continue dispensing or return to the Ready state. These actions are

selected in the menus (see section 6.10), labelled as 'Stop/Go' and 'Stop/End' respectively.

5.6 Leak Detection

The dispenser has a sensor to detect any leakage of conductive liquids (e.g. water) inside the enclosure. In the unlikely event of a leak, the pump and valve will be switched off and the dispenser will be disabled with the following display:

L	E	A	K		D	E	T	E	C	T	E	D
D	I	S	P	E	N	S	E	R		O	F	F

Please contact your supplier for assistance if this display is seen.

6. Option Menus

Option Menus are accessed from the Ready state (untimed and timed modes) by pressing and holding **ENTER** for 3 seconds.

Option menus are the first level of menu from which submenus may be reached, and are indicated by the enter symbol ↵

			E	N	T	E	R				
	M	A	N	U	A	L		M	O	D	E	↵

			E	N	T	E	R				
P	R	I	M	I	N	G		M	O	D	E	↵

			S	E	L	E	C	T			
	T	I	M	E	D		M	O	D	E		↵

If Interval Mode is selected

		S	E	T		I	N	T	E	R	V	A	L	
														↵

If Daily or Weekly Timed Modes are selected

		S	E	T		D	I	S	P	E	N	S	E	
			T	I	M	E	S							↵

If a Timed Mode is selected

A	D	J	U	S	T		C	L	O	C	K	
												↵

			C	H	A	N	G	E				
	C	A	L	I	B	R	A	T	I	O	N	↵

	C	O	M	P	E	N	S	A	T	I	O	N
			O	P	T	I	O	N	S			↵

E	X	T	E	R	N	A	L		I	N	P	U	T
		O	P	T	I	O	N	S				↵

O	U	T	P	U	T		O	P	T	I	O	N	S
													↵

	S	O	U	N	D		O	P	T	I	O	N	S
													↵

				E	X	I	T					
												↵

Pressing **UP** or **DOWN** will cycle through the option menus and **ENTER** will select a submenu, except from the Exit menu where **ENTER** will returns to the Ready state.

6.1   Manual Mode

Manual Mode is similar to Top-Up Dispensing but does not require a button to be held in order to remain in the mode and there is no target volume shown.

In the equivalent of the Ready state, the word 'MANUAL' is shown instead, with the dispensed volume on the bottom line.

			M	A	N	U	A	L				
	0	.	0	0		L	i	t	r	e	s	

Press **UP** to dispense and the display will change to show the flow-rate and dispensed volume

	3	.	1	2		L	/	m	i	n		
	0	.	2	4		L	i	t	r	e	s	

Release the **UP** button to pause dispensing

		M	A	N	U	A	L				
1	.	2	4		L	i	t	r	e	s	

To clear the measured volume, press the **DOWN** button

		M	A	N	U	A	L				
0	.	0	0		L	i	t	r	e	s	

Pressing **ENTER** returns to the Option Menu

6.2   Priming Mode

Priming Mode can be started via the Option Menus or automatically if the pump remains on for 15 seconds when it should have switched off – from the Ready or Paused states.

At the start of Priming Mode, the pump is switched off and the valve is closed

P	R	I	M	I	N	G	-	P	U	M	P		O	F	F
	V	A	L	V	E		C	L	O	S	E	D			

Pressing **UP** toggles the pump on and off. Pressing **DOWN** toggles the valve open and closed.

ENTER will returns to the Option Menu and close the valve if it was left open. If this mode was started automatically from the Ready or Paused states, **ENTER** will still access the Option Menu and enable the operator to return to Ready state.

The system can be primed by switching on the pump and opening the valve until air has been flushed out. Closing the valve should then cause the pump to stop automatically and priming has been successful.

If the dispenser entered this mode from normal operations, the dispenser will automatically return to the Ready state when priming has been successful.

If Priming Mode was entered from the option menus, priming may be continued and the display will show:

P	R	I	M	E	D		-	P	U	M	P		O	N	
	V	A	L	V	E		C	L	O	S	E	D			

6.3   Timed Mode Selection

Press **UP** or **DOWN** to cycle through the four options:
Timing Disabled
Interval Timing
Daily Timing
Weekly Timing.

Press **ENTER** to select the mode.

6.4   Interval Setting

This menu is only seen if Interval Timing mode has been selected

C	H	A	N	G	E		I	N	T	E	R	V	A	L
				0	0	:	3	0						

Times are shown in hours and minutes. The default time is 30 minutes, the minimum is 1 minute and the maximum is 24 hours.

A cursor will appear below the hours setting and the **UP** and **DOWN** buttons can be used to select the hours.

Pressing **ENTER** advances to the minutes, indicated by the cursor under the minutes setting, and **UP** and **DOWN** can be used to select the minutes.

If an interval is chosen that is shorter than the time it takes to deliver the target volume, start times will be missed. For example, if 10 litres takes just over 3 minutes to dispense, an interval setting of 3 minutes will effectively become an interval of 6 minutes.

The next press of **ENTER** saves the interval time and returns to the option menu.

6.5   Setting Dispense Times – Daily Mode

This menu is only seen if Daily Timing mode has been selected

2	4	h		M	O	D	E		T	I	M	E		1
				0	9	:	0	0						

To view previously set times without changing them, press only the **ENTER** button.

If no times have previously been set, the display will show **:**

The cursor starts under the hours setting. **UP** and **DOWN** increment and decrement the hour. **ENTER** advances to minutes, indicated by the cursor. When the minutes are correct, press **ENTER** again.

```
 2   4   h       M   O   D   E       T   I   M   E       2
                 0   9   :   0   0
```

The next time shown will be either:

    : if no time was previously set
    Or the previously saved time if **UP** or **DOWN** have not been pressed
    Or the time selected for the previous daily time number

Pressing **ENTER** when **:** is shown will exit back to the option menu.

To set fewer than the maximum of 8 times, press **UP** in the hour selection state until **:** is shown (after 24 hours), or leave the hours and minutes the same as for the previous time for that day.

If a new time is selected, **ENTER** will advance to the next time setting. After Time 8 is set, **ENTER** will return to the option menu.

6.6   Setting Dispense Times – Weekly Mode

This menu is only seen if Weekly Timing mode has been set.

```
     M   O   N   D   A   Y       T   I   M   E       1
                 0   9   :   0   0
```

Up to 8 times can be set per day, in a similar manner to that described for setting Daily times.

Previously set times can be viewed without changing them by only using the **ENTER** key

After setting Monday's times, the day will change to Tuesday, then Wednesday etc. After the last time on Sunday, **ENTER** will return to the option menu.

6.7   Clock Adjustment

This menu is only seen if a timing mode has been set.

```
     C   H   A   N   G   E       W   E   E   K   D   A   Y
 W   E   D   N   E   S   D   A   Y       1   2   :   3   4
```

UP and **DOWN** change the day of the week. **ENTER** advances to hours.

```
     C   H   A   N   G   E       H   O   U   R   S
                 M   O   N   D   A   Y       1   2   :   3   4
```

UP and **DOWN** change the hours in 24-hour format. **ENTER** advances to minutes.

C	H	A	N	G	E		M	I	N	U	T	E	S
	M	O	N	D	A	Y		0	9	:	3	4	

UP and **DOWN** change the minutes. **ENTER** zeros the seconds, writes the new time to the real-time clock IC and returns to the option menu.

6.8   Calibration Menu

The Calibration Menu allows changes or viewing of a percentage correction factor used during dispenses. The calibration limits are -12.0% to +12.0% with negative numbers reducing and positive numbers increasing the volume delivered.

	C	A	L	I	B	R	A	T	I	O	N	
		+		4	.	7	%					

UP and **DOWN** increment/decrement the percentage. Holding the button will rapidly change the percentage.

Pressing **ENTER** saves the calibration value to non-volatile memory and returns to the option menu.

6.9   Compensation Menu

There are two compensation options: FLOW ADJUST and TEMP ADJUST

F	L	O	W		A	D	J	U	S	T		O	N	
T	E	M	P		A	D	J	U	S	T		O	F	F

Pressing **UP** will toggle the FLOW ADJUST option between ON and OFF. When ON is selected, the dispenser will add to the percentage adjustment a small amount which varies with the flow-rate. This will compensate for the typical effects of flow-rate change on dispense accuracy for water.

Pressing **DOWN** will toggle TEMP ADJUST between ON and OFF. When ON is selected, the dispenser will add to the percentage adjustment a small amount which varies with temperature. This will compensate for the typical effects of water temperature on dispense accuracy.

Note that these options compensate for the characteristics of water and may not be appropriate for other liquids. Both compensation options add to the dispense volume, so when first enabled the calibration percentage may need to be reduced or made more negative.

Pressing **ENTER** saves the compensation options to non-volatile memory and returns to the option menu.

6.10 External Input Menu

I	N	P	U	T		1		A	C	T	I	V	E	-	L
I	N	P	U	T		2		A	C	T	I	V	E	-	H

The first menu enabled the active state of the two inputs to be selected. The input from a switch connected to the dispenser is low when closed and high when open or disconnected.

UP toggles the Input 1setting and **DOWN** toggles Input 2. **ENTER** advances to the Input Function menu.

I	N	P	U	T		1		A	L	A	R	M			
I	N	P	U	T		2		S	T	O	P	/	G	O	

UP cycles through Input 1function settings and **DOWN** cycles through Input 2 settings. **ENTER** saves settings and returns to the option menu.

The two inputs can be independently assigned the following functions:
- Disabled – input not used
- Alarm
- Stop/Go
- Stop/End
- Start

Alarm enables the input to determine the state of the transistor output. This requires the output to also be assigned to Alarm.

Stop/Go enables the input to halt dispensing. If dispensing had started it will pause and when the input returns to the inactive state, dispensing resumes.

Stop/End enabled the input to halt dispensing. If dispensing had started it will pause and when the input returns to the inactive state, the dispenser will return to the Ready state.

Start allows the input to start dispensing in untimed mode only. This function is different to the Remote Switch input in that it will not pause or cancel delivery once dispensing has started.

6.11 Transistor Output Menu

O	U	T	P	U	T		D	I	S	P	E	N	S	E

UP and **DOWN** cycle through the output options. **ENTER** saves settings and returns to the option menu.

Transistor output options are:
- Disabled – output not used
- Dispense – output is active whenever the dispenser operates
- Finish – active for 2 seconds at the end of a dispensing
- Warning – active whenever as error condition occurs that would cause a warning beep (see Sound Menu)
- Alarm – active if an external input is assigned to Alarm and is active
- Stop – active if an external input is assigned to Stop and is active

6.12 Sound Menu

There are two audio options: FINISH BEEP and WARNING BEEP

	F	I	N	I	S	H		B	E	E	P		O	F	F
W	A	R	N	I	N	G		B	E	E	P		O	N	

Pressing **UP** toggles the FINISH BEEP option between ON and OFF. When ON is selected, a long beep will sound at the end of dispensing.

Pressing **DOWN** will toggle WARNING BEEP between ON and OFF. When ON is selected, short beeps will be heard to warn of error conditions. These include:
- Flow-rate outside accurate dispensing limits (below 0.5L/min or above 5.0L/min)
- Priming error
- Leak detected

Pressing **ENTER** saves the sound options to non-volatile memory and returns to the Option Menu.

7. Remote Switch

A circular 2-pin socket is available on the rear of the dispenser and may be used as a remote switch input. The dispenser comes with a 2-pin mating plug and it is left for the user to wire to this plug the preferred type of switch. The two wires from a passive switch can be connected either way to these pins.

The input duplicates the function of the **ENTER** button when the dispenser is in the Untimed Ready, Dispensing and Paused states. It can therefore start dispensing in untimed mode, or pause, restart and cancel dispensing in all modes. It cannot be used to access or navigate the Option Menus.

This input is typically connected to a foot-switch to allow hands-free starting of the dispenser.

8. Transistor Output

A circular 3-pin socket is available on the rear of the dispenser for the transistor output. The dispenser comes with a 3-pin mating plug, connection details shown below:
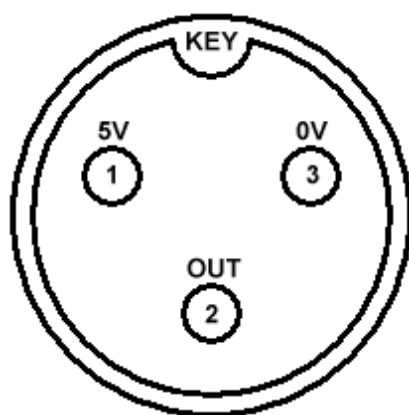
The output is from an open-collector transistor which must be pulled high externally and connects to the 0V rail when active. The output can be pulled high to a maximum of 40V and can sink up to 50mA, with the current limited to protect the transistor from a short-circuit. If used to switch an inductive load, measures must be taken to protect the transistor from high transient-switching voltages.

The 5V pin is current-limited and can supply up to 50mA. This pin may be used to drive an external circuit controlled by the transistor output, for example, to power an external buzzer alarm.

The output is typical used to drive an external relay to control a pump or valve in conjunction with an activity of the dispenser – see the Transistor Output Menu section (6.11) above.

9. External Inputs

A circular 6-pin socket is available on the rear of the dispenser to provide input from two external sources. The dispenser comes with a 6-pin mating plug, connection details shown below:
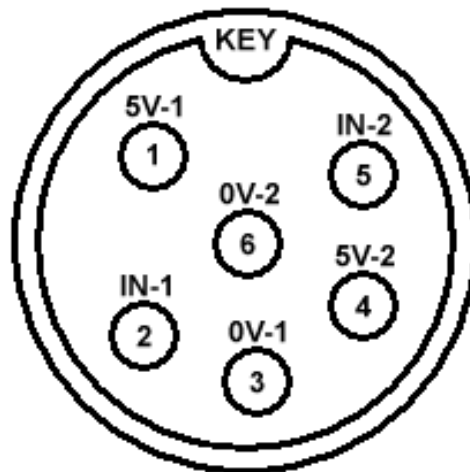
The two input circuits are identical. Normal passive switches connect between the IN and 0V pins. The 5V pins can supply up to 50mA (combined) to power active switching devices such optical level sensors, Hall-effect switches or the Deeter Leak Sensors.

The inputs are assigned functions via the External Input Menu (see 6.10). They are typically connected to float switches for detecting emergency stop levels, but may be used in conjunction with the output to provide a wide range of installation-specific requirements. For example:

With a float-switch set to the Start function fitted at the bottom of a vessel and another float-switch set to the Stop/End function fitted at the top of the vessel, dispensing can be started and stopped automatically, according to levels in the vessel.

Note that in this arrangement the dispenser does not determine the volume delivered, but while the top float-switch remains active, will display the volume it measured.

If, in the above arrangement, the transistor output is assigned to the Dispense function and switches on a valve or pump (via a relay), this could empty the vessel when it is full, making the filling and emptying cycle fully automatic.

10. Serial Communications Control

The dispenser has a serial communication option to enable automated control and monitoring by computer. Communication is via USB and requires a PC-to-printer cable with a USB type-B connector at the dispenser end (not supplied)

The PC software available for the dispenser replicates the operator controls and makes it easy to access options settings and view progress during dispensing. For those who wish to develop their own PC control and monitoring software, details of serial port settings and the command structure are given in Appendix A.

Note: the software was originally developed for the Deeter Liquid Volume Dispenser and is currently limited to the range of functions of the Deeter Automatic Liquid Dispenser in untimed mode and without the optional external input and output features. Future developments will extend the command set and enhance the PC software to include all features. References to the Liquid Volume Dispenser in this section also apply to the Automatic Liquid Dispenser.

10.1 PC Software Installation

The PC software can be downloaded from www.deeter.co.uk/downloads. Once downloaded, extract all files from the zipped file to a suitable directory, e.g. c:\Deeterflow and click on the *setup.exe* file.

The application software uses Microsoft NET Framework v3.5. The installer will attempt to download and install this software from Microsoft, so you must be connected to the internet when the application is first installed. You must also agree to Microsoft"s terms and conditions to use NET Framework. The application has an "unknown publisher" (i.e. Deeter).

After installation, the application can be run from the Start button:
    Start|All Programs| Deeter Electronics Ltd| LiquidVolumeDispenser

10.2 USB Drivers

Connect the USB cable and ensure the dispenser is powered up. The first time this connection is made, the Windows driver for this USB device must be installed, either by plug-and-play (if available) or by downloading the driver.

Drivers for a wide range of operating systems can be downloaded free of charge from www.ftdichip.com. The Virtual COM Port (VCP) driver is required for use with the PC software supplied with the dispenser and makes the dispenser appear as a standard RS232 device.
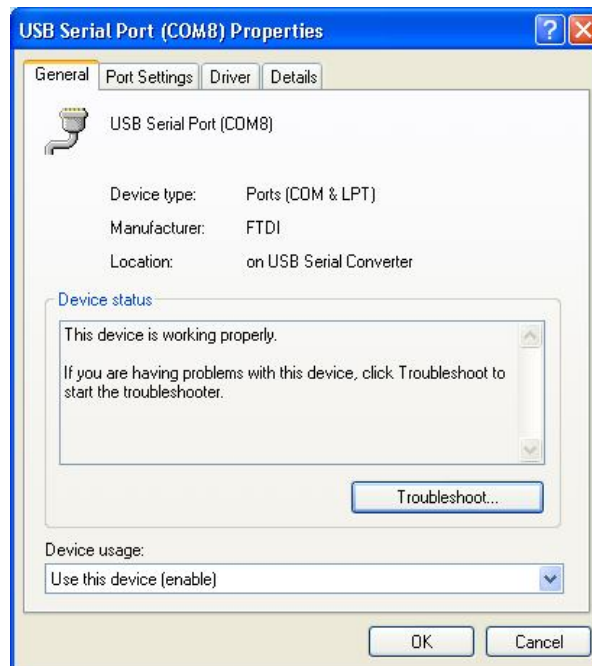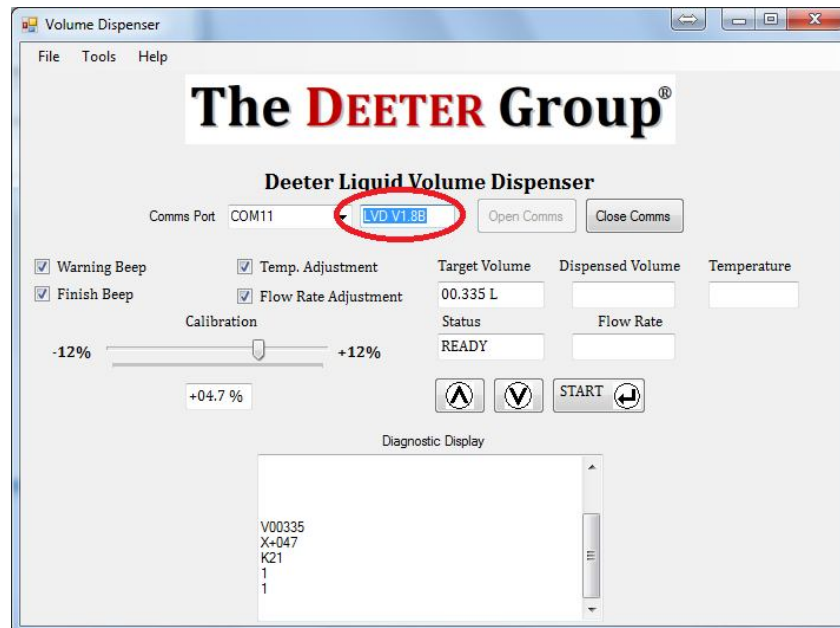
## 10.3 Using the Software

When started, the software will display a drop-down list of the available comms ports. Select the virtual comms port for the USB device.
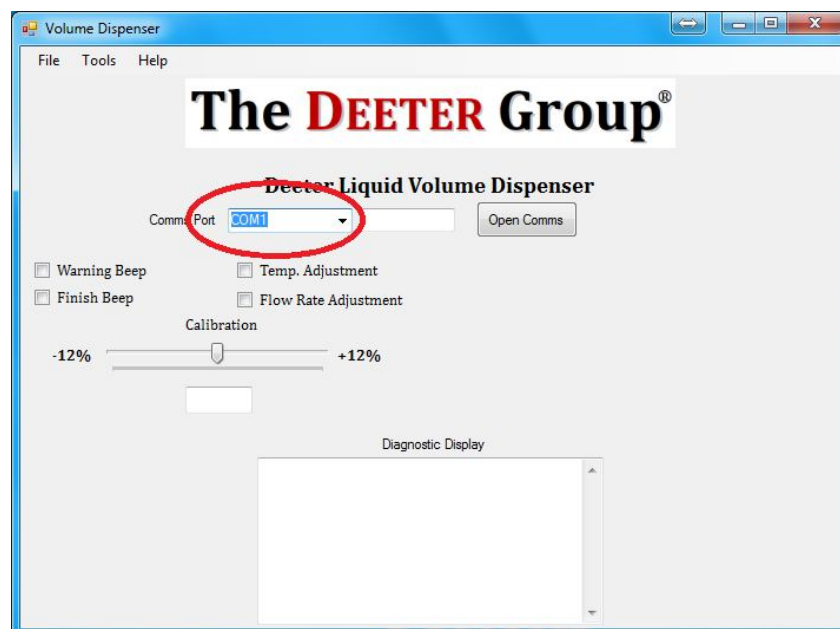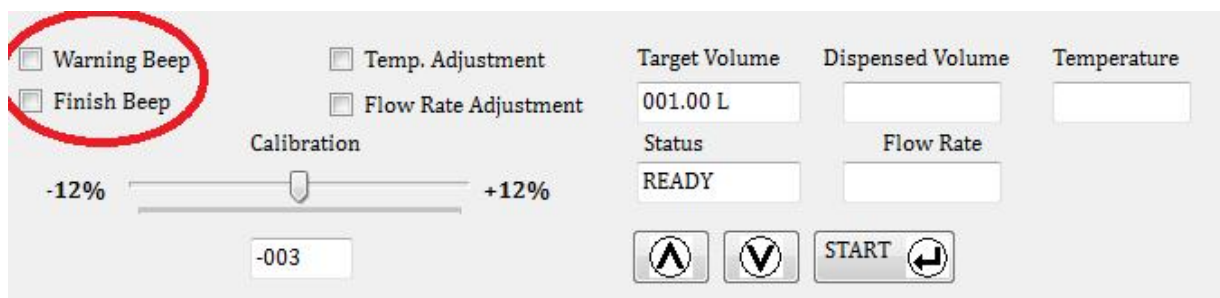

On initial connection, the dispenser will fill in the current firmware version and automatically display the current settings for Target Volume etc.

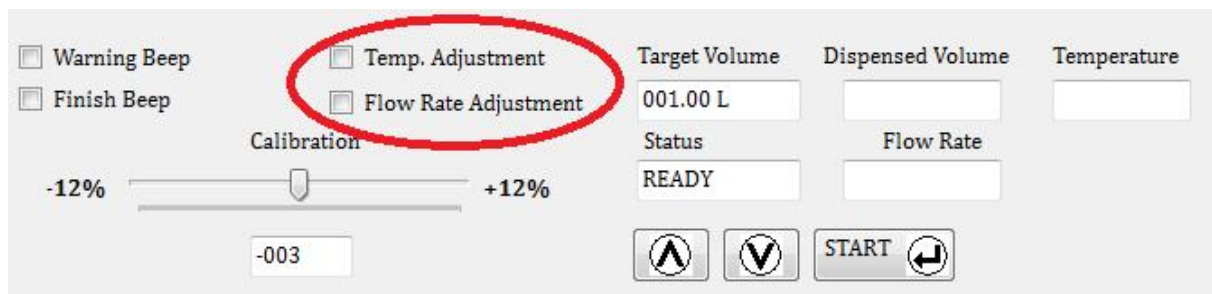The Status will change to Ready after displaying the current firmware version.
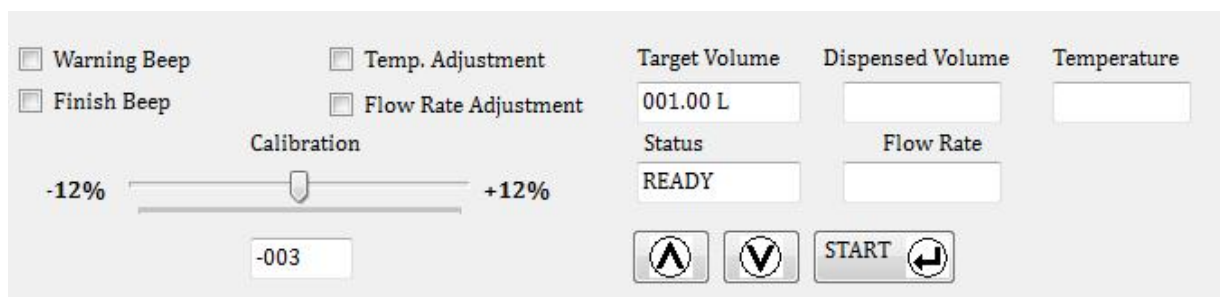
The following options are adjustable.

These two check boxes allow you to enable and disable the Finish Beep and Warning Beep.

Finish Beep - A simple Beep upon completion of the dispensing of liquid.

Warning Beep - This Beep is heard if the flow rate goes above or below the limits for accurate dispensing.
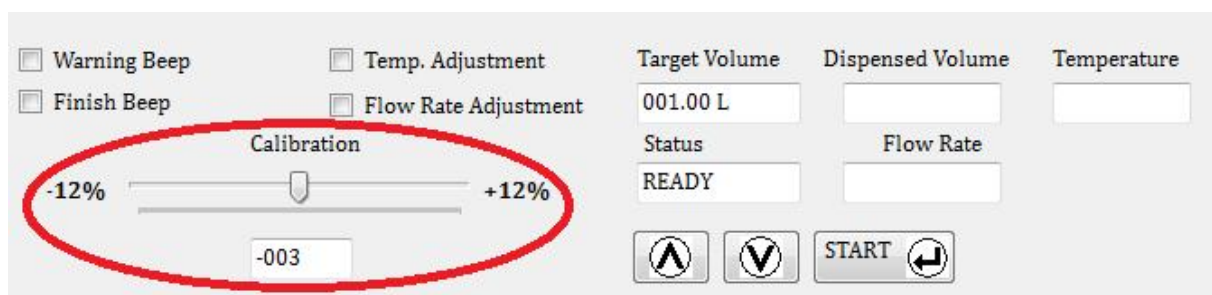

These two check boxes allow you to Enable and Disable the Automatic adjustments for Flow Rate and Temperature. The default state of these options is enabled.
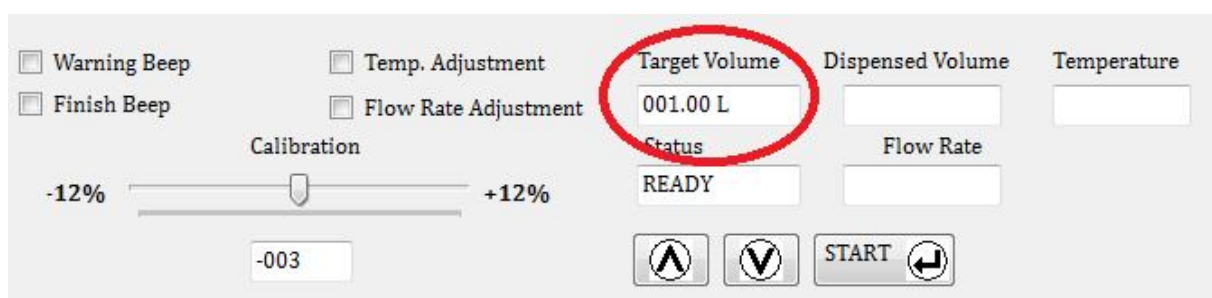
Temp. Adjustment – By default the dispenser will add a percentage to the dispense volume in accordance with the temperature, compensating for the typical effects of water temperature on dispense accuracy, between 0C and 43C.

Flow Rate Adjustment – By default the dispenser will compensate for the rate of flow.

Note that these options compensate for the characteristics of water and may not be appropriate for other liquids. Both compensation options add to the dispense volume, so when first enabled the calibration percentage may need to be reduced or made more negative.

The calibration percentage can be set between -12% and +12%, in units of 0.1%. Use the arrow keys to make fine adjustments.

The Target Volume panel shows the volume to be dispensed.

Press Ⓐ to increase the volume. The maximum setting is 100.00 litres.

Press Ⓥ to decrease the volume. The minimum volume setting is 0.20 litres.

The Target Volume can be entered directly into the box or by clicking on UP or DOWN. Please note the maximum and minimum volumes are 100.00 and 00.20

Click [START ↵] to start dispensing.

10.4 Diagnostic Display
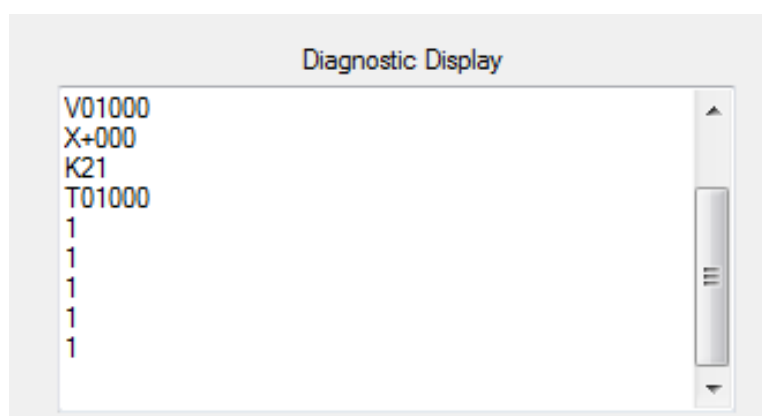
This display shows the commands flowing between the Liquid Dispenser and the PC software via the serial connection and is there for diagnostic purposes only. Appendix A provides a list of the commands and reports that may be seen.

11. Filter

A stainless steel filter is accessible from the rear of the dispenser. The 60-mesh (25 micron) filter is positioned immediately after the inlet to prevent particles reaching any of the internal apparatus.

The first sign of a blocked filter is reduced flow-rate, so the filter should be checked whenever the flow-rate becomes unusually low.

Unscrewing the filter cap will allow liquid to escape and measures should be taken to capture or soak-up any spillage. Once unscrewed, the stainless steel mesh can be pulled away from the filter body, rinsed to clear any blockages and returned.

The dispenser will have air in the inlet tube after the filter has been cleaned and some liquid will need to be pumped through the dispenser to flush this air out.

12.   Specifications

Dimensions	265mm wide, 120mm high, 295mm deep (excluding plumbing and wiring connections)
Power supply	10-15V @3A (12VDC mains adapter supplied)
Fuse	4A, anti-surge, 5x20mm cartridge
Liquid connections[1]	8mm OD, John Guest Speedfit®
Serial communications connector	USB type B socket
Remote switch connector	Locking 2-pin DIN plug (Mating socket supplied)
Transistor output connector	Locking 3-pin DIN plug (Mating socket supplied)
External input connector	Locking 6-pin DIN plug (Mating socket supplied)
Transistor output	NPN open-collector. Maximum collector voltage = 40V Maximum current = 50mA
5V supply to transistor output and external input connectors	Maximum current = 50mA (total combined output)
Dispensed volume range	0.20 – 100 litres in 0.01 litre steps
Nominal flow-rate[2]	3.2 litres per minute
Flow-rate range[3]	0.5 – 5.0 litres per minute
Dispense accuracy[4]	±1%
Liquid temperature range	0°C to +43°C
Filter	Stainless steel, 60 Mesh (250 microns)
Wetted materials	acetal (polyformaldehyde) Santoprene (EPDM/polypropylene composite) polyether polyurethane glass-filled polypropylene glass-filled polyamide (Nylon) polyamide-12 (Nylon-12) nitrile rubber (NBR) EPDM rubber stainless steel
Pump sound level	65 decibels (typical)

[1] Suitable tube materials include: polyethylene, nylon, polyurethane, brass, copper, mild steel. For soft or thin-walled tubing, tube inserts should be used.

[2] For water with 12V supply, clear filter, minimal external tube restrictions and minimal pumping height.

[3] For accurate dispenses

[4] Water at constant temperature and flow rate

Deeter House, Valley Road, Hughenden Valley, High Wycombe, Buckinghamshire. HP14 4LW

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Appendix A – Serial Port Settings and Commands

The serial port settings are: 19200 baud, 8 data bits, no parity bit, 1 stop bit.

Commands have the following structure (ignore spaces, inserted for clarity):

    S C P1 P2 … Pn CS

where

    S   is the sequence start character, 'S'

    C   is the command character in the range 'A' to 'Z' (case sensitive)

    P1 to Pn are parameters in the range '0' to '9', plus '+', '-', and '?'

    CS   is a two-byte checksum

The checksum is the 8-bit sum of the command character and the parameter characters. It is the sum of the ASCII characters, not the numbers they represent, and is sent as a hexadecimal number represented by two ASCII characters in the range '0' to '9' and 'A' to 'F'

All valid commands are acknowledged by echoing back the command character followed by the carriage return character, 0Dh. Reports start with the command character and are terminated with carriage return.

Invalid commands, sequences with parameters outside the permitted range, or incorrect checksums will return 'B' and carriage return.

The 'S' character will clear any previous partial command sequence to start a new one.

Command List

Commands (with parameter ranges shown in brackets) are:

A   **A**uto report off/on (0/1), minutes (0-9), seconds (00-59)

If auto-report is enabled, a report of the dispensed volume, flow-rate, temperature, and mode will be sent at regular intervals while dispensing. Reports will stop after the target volume has been reported. Reports are of the form:

    A<xxxxx>,<yyyyy>,<zzz>,<m><CR>

where <xxxxx> is the dispensed volume in centilitres (5 bytes), <yyyyy> is the flow-rate in centilitres per minute (5 bytes), <zzz> is the temperature (3 bytes), <m> is the Mode (see the Report Mode command) and <CR> is the carriage return character 0Dh. Each parameter is separated by a comma.

The temperature is in units of 0.5C with a default zero at -21C (see K command). For example, the number 415 would represent 20.5C (41.5 – 21 = 20.5)

C   report dispense **C**ompletion off/on (0/1)

If enabled, a report will be sent when the target volume has been reached. The report is of the form:

    C<x><CR>

where <x> is '0' if the flow rate has been outside limits for accurate dispensing, and '1' if the flow rate has kept within limits.

D   report **D**ispense volume

This will return the present dispensed volume in the form:

    D<xxxxx><CR>

where <xxxxx> is the dispensed volume in centilitres.

E   set **E**nd beep off/on (0/1/?)
A '?' after the command character will return the current status of the End Beep.

F   report **F**low rate
This will return the present flow rate in the form:
      F<xxxxx><CR>
where <xxxxxx> is the flow rate in centilitres per minute. Note: the maximum flow rate should be less than 5 litres per minute so the first two digits should always be '0'.

G   **G**o
This command will start a dispense

H   **H**alt
This command will terminate a dispense

I   set Temperature Adjustment off/on (0/1/?)
A '?' after the command character will return the current on/off status of the Temperature Adjustment.

J   Temperature
This will report the temperature in degrees C to the nearest 0.5C. The temperature is preceded by a '+' or '-' sign and includes a decimal point before the final digit.

K   set thermistor zero-offset temperature (00-99/?)
The default zero offset for the thermistor is -21C. Any variation from this will have little or no effect on temperature compensation, but absolute temperatures can be displayed by the PC software and this command allows for calibration of the displayed temperature.

A '?' after the command character will return the current zero offset in the form:
      K<xx><CR>
where <xx> is the offset temperature in C

L   set Flow-Rate Adjustment off/on (0/1/?)
A '?' after the command character will return the current on/off status of the Flow-Rate Adjustment.

M   report **M**ode
This will return:
      M<n><CR>
where <n> is a number from 1 to 4 to indicate the current status of the dispenser:
    1   Ready
    2   Dispensing
    3   Paused
    4   The dispenser is under operator control from the keypad (e.g. manual dispensing, option setting, etc.)

N   report version **N**umber
This will return the firmware version number e.g. 'ALD V1.01'

P   **P**ause
This command will pause the current dispense, allowing it to continue later.

R **R**estart
This command will restart a paused dispense

T report **T**arget volume
This command will return the target volume in the form:
    T<xxxxx><CR>
where <xxxxxx> is the volume in centilitres.

V set **V**olume (00010-10000/?)
Sets the target volume in centilitres.
A '?' after the command character will report the target volume (same as the T command)

W set **W**arning beep off/on (0/1/?)
A '?' after the command character will return the current status of the Warning Beep.

X set calibration percentage (-120 to +120/?)
Sets the percentage calibration adjustment in units of 0.1%. The first parameter must be '-' or '+'.

A '?' after the command character will report the calibration (same as the Y command)

Y report calibration
This command will return the present calibration in the form:
    Y<s><xxx><CR>
where <s> is the sign character '-' or '+', and <xxx> is the adjustment in 0.1% units.